

Critical species of Odonata in China

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ABSTRACT

The state of knowledge of China's Odonata is very much incomplete with many species awaiting description, especially from tropical and subtropical areas. A brief account is given of new odonate species described from China, including Taiwan, between 2000 and 2003. Information on identification guides, faunal lists and current studies, is provided. Species of Odonata, categorised as critically endangered or endangered in the 2003 IUCN Red List of threatened species, which are known to occur in China, are listed. Lists of Odonata, recommended by the IUCN Odonata Specialist Group as priority species for conservation, are updated to incorporate recently described species from China and Taiwan. Key threats to China's forest and surface waters are summarised. China has an ambitious programme to establish nature reserves and protect a high proportion of the country's natural resources. A brief account of China's protected areas and wetland conservation action plan is provided.

REGIONAL DEFINITION

Mainland China stretches for ca 5,000 km from east to west and for ca 5,500 km from north to south and covers an area of ca 9,572,900 km², which is approximately one-fourteenth of the land area of the Earth. It has land borders with Vietnam, Laos, Myanmar (Burma), Bhutan, India, Pakistan, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia, Russia and Korea. Its sea borders include the Yellow Sea and the East China Sea to the east and the South China Sea to the south. For the purposes of this review information on Taiwan has been included since it is an integral part of the zoogeographical area of China.

Most of China is located within the eastern part of the Palaearctic region. There is a narrow tropical strip at the southern end of the country belonging to the Oriental region. China's climate is dominated in winter by northerly monsoonal winds which are cool and dry. In summer, moist winds from the south predominate. Climatic conditions vary dramatically from region to region within China. The north-west is extremely dry, very cold in winter and very hot in summer, in contrast to the tropical region to the south, which includes Hainan and southern Taiwan, which experiences moderately hot summers with high rainfall and cool, dry winters.

STATE OF THE ART

Mainland China contains a wide variety of ecosystems supporting a great diversity of fauna and flora. More than 27,000 species of higher plants, 2,300 terrestrial vertebrates, which represent some 10% of world total, and 800 aquatic vertebrates have been recorded (Mackinnon et al. 1996). The number of Odonata to be found in China is difficult to estimate since no comprehensive country list has been prepared for China since Needham's (1930) first catalogue of Chinese odonates and many new species await description. Tsuda (2000) listed 532 species but this publication omits many published Chinese records. The number of odonates now known from Fujian is 199 (Huang 1999) and the number from Guangdong alone exceeds 200 (K.D.P. Wilson unpubl.). Well over 350 species have been recorded from tropical southern China (Guangdong, Guangxi, Hainan, and Taiwan). The total number for China, including Taiwan, of known published records is likely to exceed 700 species, with many species awaiting descriptions.

Biodiversity

The National Environmental Protection Agency of China (NEPA) published a Biodiversity Conservation Action Plan (NEPA 1994), which provided a comprehensive framework for achieving conservation of China's biodiversity resources. This was followed up by NEPA, when it published "China's biodiversity: a country study" (NEPA 1998). This report catalogued China's biodiversity, providing details of measures taken to protect China's biodiversity, utilise it sustainably, and provided a cost benefit analysis of biodiversity conservation.

In 1996 the World Wide Fund for Nature International, China Programme, published a biodiversity review of China (Mackinnon et al. 1996). This valuable review made a number of recommendations for all provinces and regions throughout China for extending and improving selected protected areas. These recommendations were based principally on known information on the occurrence of plants, mammals and birds, the general site condition and its potential for achieving biodiversity conservation.

In 1998 BirdLife International published a detailed report on endemic bird areas of the world (Stattersfield et al. 1998). Thirteen, out of a global total of 218, endemic bird areas were included within or part within China. These comprise Taklimakan mountains, eastern Himalayas, southern Tibet, eastern Tibet, Qinghai mountains, Shanxi mountains, central Sichuan mountains, west Sichuan mountains, Yunnan mountains, Chinese subtropical forests, south-east Chinese mountains, Hainan and Taiwan. For the area covering Chinese subtropical forest the report remarked that no documented ornithological surveys have been conducted for much of Guizhou, Guangxi and Guangdong. This is being addressed by the Kadoorie Farm & Botanic Garden Corporation (KFBG) who, after conducting pilot surveys in 1997, launched a South China Biodiversity Conservation Programme in 1998. The aim of the programme is to help minimise the loss of biodiversity in South China's forest ecosystems. The first stage of the programme has involved completion of rapid biodiversity surveys of flora and fauna, including Odonata, in protected areas. These were

largely completed during 1998-2001 but additional targeted surveys have been undertaken during 2002-2003. The next stage of the programme will involve consideration of options and recommendations for active intervention to help minimise biodiversity losses.

Newly described Odonata from China during 2000-2002

During the twentieth century, apart from Needham's publication on the dragonflies of China (Needham 1930), and Chao's concentrated work on gomphids in the mid-1950s (Chao 1952, 1953, 1954), odonates were described from China at a somewhat modest rate until renewed interest during the 1980s. In the ten-year period, from 1990 to 1999 inclusive some 79 species were described from China and Taiwan.

Odonata continued to be described at a high rate during the period 2000-2002. Between 2000 and 2001 two publications established two new genera, endemic to China; the first *Sinocnemis* (Platynemididae) (Wilson & Zhou 2000) with species described from Sichuan and Guizhou and the second *Priscagrion* (Megapodagrionidae) (Zhou & Wilson 2001) with two new species described from Guangxi and Guizhou. Other zygopterans described recently include *Matrona cyanoptera* (Hämäläinen & Yeh 2000) from Taiwan, *Paracercion yunnanensis* (syn. *Cercion*) (Zhu & Han 2000) from Yunnan and *Coenagrion bifurcatum* (Zhu & Ou-Yan 2000) from Heilongjiang. Two new species of *Rhipidolestes* were described by Wilson (2000) from southern China.

Yeh & Chen (2000) described two new species of *Oligoaeschna* from Taiwan and later Wilson & Reels (2001) described a further species of this genus from Hainan. This latter description was part of a monograph cataloguing 127 species from Hainan Island, which is located in tropical China. In total 12 new species were described from Hainan in the monograph, one of which, *Chlorogomphus icarus* was later synonymised (Wilson 2002) with *C. usudai* Ishida, 1996. Karube and Yeh (2001) established a new genus *Sarasaeschna* to receive members of Lieftinck's *O. pryeri*-group. All three of the recently described *Oligoaeschna* species from Chinese territory belong to *Sarasaeschna* formally known as the *pryeri*-group.

A new gomphid, *Lamelligomphus hanzhongensis*, was described from Zhejiang (Yang & Zhu 2001) and Karube (2001) described *Chlorogomphus daviesi* from Yunnan. Later Wilson (2002) described another two new species of Chlorogomphidae from southern China. The corduliid, *Somatochlora taiwana*, was described from Taiwan (Inoue & Yokota 2001).

Newly described Odonata from China during 2003

Recently Zhou (2003) described *Macromia hamata* from Guizhou and Wilson & Reels (2003) described six new species of zygopteran from Guangxi, including two species of *Megalestes*, and single species of *Rhipidolestes*, *Calicnemia*, *Coelliccia* and *Drepanosticta*.

Identification guides

With the exception of Chao's work odonates have not often been the subject of extensive academic study by mainland Chinese, principally due to their perceived lack of economic importance, either as a food item or as an agricultural pest. Needham (1930) published a manual to the odonates of China which was the first comprehensive account produced for the Chinese fauna. Over 50 years later the first book written in Chinese (Sui & Sun 1984) was published, describing the common odonate species known from China, but many widespread southern Chinese species were omitted from this text.

The Chinese gomphids were comprehensively studied by the late Chao Hsiufu who summarised the taxonomic work on Chinese gomphids in his book (Chao 1990). To assist water quality monitoring studies Chao (1994) provided keys to all the known Chinese genera of odonate larvae. The following year Chao (1995) provided an identification guide to all the known gomphid larvae of Fujian, which was the province where Chao was born and lived most of his life.

During the mid-1990s a series of guides were published for Hong Kong and Taiwan. First, Wilson (1995) published a book describing 104 species then known from Hong Kong. Later, Wang & Heppner (1997) produced a guidebook to the odonates of Taiwan, part 1. An additional book on the Odonata of Yangmingshan National Park in northern Taiwan was provided by Chang & Wang (1997), covering 91 species. Comprehensive information on all the known Taiwan odonates was provided in a book containing excellent photographs of the majority of Taiwanese species (Wang 2000). Species accounts of 199 species known from Fujian Province were published in Chinese by Huang (1999). Recently the 1995 Hong Kong Odonata guide was updated and provided in field guide form (Wilson 2003) with keys and status details of 111 odonate species known from Hong Kong.

Table 1. Odonata in the 2003 IUCN Red List of threatened species recorded from China and Taiwan with updated information. — CR: critically endangered; EN: endangered; DD: data deficient; RR: range restricted; IC: identity of species needs clarification. A: action recommended, because of habitat destruction.

Family/species	CR	EN	DD	RR	IC	A	Distribution and notes
Coenagrionidae							
<i>Mortonagrion hirosei</i> * Asahina, 1972	○	●	○	○	○	○	China (Hong Kong), Japan
Corduliidae							
<i>Hemicordulia mindana nipponica</i> Asahina, 1980	○	●	○	○	○	○	Japan, Taiwan
<i>Macromia urania</i> Ris, 1916	○	●	○	○	○	○	China, Japan, Taiwan, Vietnam
Libellulidae							
<i>Libellula angelina</i> Selys, 1883	●	○	○	○	○	○	China, Japan, Korea
<i>Lyriothemis tricolor</i> Ris, 1919	○	●	○	○	○	○	Bangladesh, China incl. Taiwan, India, Japan, Myanmar.

*Red-listed species recorded from China or Hong Kong since IUCN publication (Moore 1997)

Faunal lists

Tsuda (2000) listed 532 species for mainland China but it should be noted this publication omits a number of published Chinese records. Separately Tsuda (2000) listed 141 taxa for Taiwan and 107 species for Hong Kong. Hua (2000) listed the Odonata of China in volume 1 of a publication series, which aims to list the entire Chinese insect fauna. However, a large number of synonyms are included in this list and many records are omitted. Keith Wilson and Clive Lau are currently working on a list for China and Taiwan which already exceeds 700 species. At the provincial level Chao (1992) listed 96 species from Yunnan Province. Additional provincial lists include 199 species from Fujian (Huang 1999) and 127 species from Hainan (Wilson & Reels 2001). Recently Wilson & Reels (2003) recorded 74 species of Zygoptera from Guangxi.

CRITICAL SPECIES

Species in the IUCN Red List

In the Red List of threatened species (IUCN 2003) two odonate species are listed from China and two from Taiwan. These species comprise *Libellula angelina*, categorised as critical endangered from China, *Macromia urania* listed as endangered, from both China and Taiwan and *Lyriothemis tricolor* listed as endangered from Taiwan. *Hemicordulia mindana nipponica* is listed as endangered on the web-based 2003 Red List of threatened species from Japan and is also known to occur in Taiwan. A further red-listed species, *Mortonagrion hirosei*, has now been recorded from Hong Kong (Asahina 1992) and *Lyriothemis tricolor* is now known from several sites in mainland China (Wilson & Reels 2001, 2003). These additional species have been incorporated into an updated Red List for China (see Table 1). All five of these Chinese species are listed as a consequence of their listing for Japan, which focused on Japanese status and distribution at a time when their global distribution wasn't fully appreciated.

Insufficient faunistic knowledge and lack of distributional information for extensive areas of China prevents the preparation of reliable recommendations for red-listing of Chinese odonates at this stage. The first step is to prepare a comprehensive country list with known distributional data.

Priority species: taxonomically isolated species

The IUCN Odonata Specialist Group (Moore 1997) prepared a table of taxonomically isolated species, which included several taxa known from Chinese territory. The list included all the extant species in the genera *Pseudolestes*, *Rhipidolestes*, *Philoganga*, *Philosina*, *Caliphaea* and *Onychothemis*, which are all genera with representatives in China (see Table 2). Since this publication a further six species of *Rhipidolestes* have been described from China (Wilson 1997, 2000; Davies 1998; Zhu & Yang 1998; Wilson & Reels 2003). In addition *Philosina* has been described from China (Wilson 1999). This species, *P. alba* is now known from China (Hainan and Guangdong) and Laos (Wilson & Reels 2001).

Priority species: species of monotypic genera confined to one country

Nine species of monotypic genera, recorded only from China, were listed by the IUCN Odonata Specialist Group (Moore 1997). These species are listed in Table 3. Since the publication of this table a new species of *Philosina* and two new species of *Amphigomphus* have been described and two further species of *Shaogomphus* have been recognised from previously described taxa. All three of these genera now have representatives in other countries than China.

Table 2. Taxonomically isolated species recorded from China and Taiwan based on recommendations by Moore (1997).

Family/species	Distribution and notes
Amphipterygidae	
<i>Philoganga robusta</i> Navás, 1936	China (Fujian, Guangxi, Hainan, Jiangxi & Sichuan)
<i>vetusta</i> Ris, 1912	China (Fujian, Guangdong and Hong Kong)
Calopterygidae	
<i>Caliphaea confusa</i> Hagen in Selys, 1859	China
<i>consimilis</i> McLachlan, 1894	China (Fujian, Guangxi, Sichuan, Yunnan, & Zhejiang)
Megapodagrionidae	
<i>Lestomima flavostigma</i> May, 1933	China
<i>Philosina alba</i> Wilson, 1999	China (Hainan, Guangdong), Laos
<i>buchi</i> * Ris, 1917	China (Fujian, Guangdong & Guangxi)
<i>Pseudolestes mirabilis</i> Kirby, 1900	China (Hainan)
<i>Rhipidolestes aculeatus</i> Ris, 1912	Japan, Taiwan
<i>alleni</i> * Wilson, 2000	China (Guangxi)
<i>apicatus</i> Navás, 1934	China (Zhejiang)
<i>bastiaani</i> * Zhu and Yang, 1998	China (Shaanxi)
<i>bidens</i> Schmidt, 1931	China (Zhejiang)
<i>cyanoflavus</i> * Wilson, 2000	China (Guangdong)
<i>janetae</i> * Wilson, 1997	China (Hong Kong)
<i>jucundus</i> Lieftinck, 1948	China (Fujian)
<i>loui</i> * Wilson & Reels, 2003	China (Guangxi)
<i>nectans</i> (Needham, 1929)	China (Zhejiang)
<i>rubripes</i> (Navás, 1936)	China (Jiangxi)
<i>truncatidens</i> Schmidt, 1931	China (Guangdong)
<i>yangbingi</i> * Davies, 1998	China (Sichuan)
Libellulidae	
<i>Onychothemis testacea</i> * Laidlaw, 1902	China (Guangdong, Hong Kong) & Taiwan; India, Malaysia, Myanmar, Sri Lanka, Thailand & Vietnam.

* Described or recorded from China since the publication of Moore (1997)

Priority species: species which are special because of their biology

A single species known from China was listed by the IUCN Odonata Specialist Group (Moore 1997) under the unusual biology classification (see Table 4). It is recommended that *Orthetrum poecilops* Ris, 1919 should also be included under this category as it is tolerant of highly saline conditions and can occur below the high tide level in mangroves in China and Japan (Wilson 2001).

CRITICAL SITES AND THREATS

Environmental degradation has escalated rapidly in China over the past fifty years. The main problems are desertification of its natural grasslands, loss of natural forest cover from temperate and tropical areas, pollution of streams and rivers, acid rain in the southwest, sedimentation and flooding caused by loss of forest cover, particularly in the upper catchments and lowering of water tables resulting in drying up of natural lakes.

Forests

China supports large areas of natural forest cover but despite the introduction of protective measures illegal logging and environmental degradation continues. The authorities responsible for establishing protected areas are acutely aware of the problems and consider the adoption of measures to help reduce impacts from illegal logging and hunting, and the need to improve local management and education as high priorities.

In 1979 a new Forest Law was established aimed at ultimately establishing an ambitious 30% forest cover over the whole country with 40% in mountainous areas. The Forest Law also prohibited logging in protected areas. Although historically more than 50% of China was forested these targets are a little unrealistic, especially over the short term, and the current five-year target is to achieve an overall forest cover of 18.2% by 2005.

The result of the 5th National Forest Resource Census was published by the State Forestry Administration of China (SFA) on 13 June 2000, indicating national forest land coverage had increased to 16.55% (Zhou 2000). This figure includes 47 million ha of planted forest, the largest country figure in the world. A significant proportion of the planted forest involves establishment of extensive non-native forest such as eucalyptus plantations in the Leizhou peninsula, Guangdong and Hainan. The total forest area now stands at 160 million ha (2000 figures). The census report also cautions that an average forest area of 2.163 million ha is converted to non-forest annually. The main demand for timber is still achieved through logging from native forests.

An independent survey published in August 2001, based on analysis of satellite imagery and principally funded by United Nations Environment Programme (UNEP 2000), estimates 80% of remaining global closed forests, which include

virgin, old growth and naturally-regenerated woodlands, are located in just 15 countries one of which is China. The authors recommend targeting conservation funding in these countries but warn that pressure from people and population growth in India and China, may require a bigger effort to conserve and protect their forests, than places such as Peru which has low people pressure.

In 1999 the IUCN produced a research report for the World Bank - WWF Alliance for Forest Conservation and Sustainable Use under the auspices of the IUCN/WWF Forest Innovations project (Dudley & Stolton 1999). The report involved completion of surveys in protected forest areas in 10 countries including China. Wolong, Xishuangbanna, Dong-zaigang and Bawangling were studied in China. The report concluded that all four of these reserves were facing serious threats or were suffering degradation despite two of them having acceptable management plans and good funding.

Today the rate of logging of natural forest exceeds rates of replanting. Even though national and provincial authorities have ordered a halt to logging of native forests local authorities are unable or unwilling to take effective enforcement action due to lack of alternative employment. In many forested protected areas dominated by minority populations, tree cutting occurs for use as firewood and for making saleable forest products such as yokes for livestock. Sustainable harvesting of forest products is often undermined by population growth involving expansion of minority populations into protected areas.

China announced in late December 2000 that it intended to invest a total of 96.2 billion yuan (US\$ 12 billion) in the protection of natural forests between 2000 and 2010. This initiative is part of an effort to increase the forest coverage by 3.7% to achieve 21% in the upper reaches of the Yangtze River and the middle and upper

Table 3. Species of monotypic genera confined to China recommended by Moore (1997) with updated information.

Family/species	Distribution
Megapodagrionidae	
<i>Agriomorpha fusca</i> May, 1933	China
<i>Lestomima flavostigma</i> May, 1933	China
<i>Philosina buchi</i> Ris, 1917	China ^{1,2}
<i>Pseudolestes mirabilis</i> Kirby, 1900	China (Hainan)
Gomphidae	
<i>Amphigomphus hansonii</i> Chao, 1954	China ²
<i>Eogomphus neglectus</i> (Needham, 1930)	China
<i>Gastrogomphus abdominalis</i> (McLachlan, 1884)	China
<i>Labrogomphus torvus</i> Needham, 1931	China
<i>Shaogomphus lieftincki</i> Chao, 1984	China ²

¹ New species within this genus described from China since publication of Moore (1997)

² New species within this genus described or recognised from outside China since publication of Moore (1997)

Table 4. Species which is special because of its unusual biology, recommended by Moore (1997), now known from China.

Species	Distribution and notes
<i>Mortonagrion hirosei</i> Asahina, 1972	China (Hong Kong) and Japan. This species breeds in saline water. Recorded from Hong Kong (Asahina 1992)

reaches of the Yellow River, and to achieve effective protection of forests areas in northeast China and Inner Mongolia, totalling some 33 million ha. This project will involve the cessation of logging of natural forests in the upper reaches of the Yangtze River and the middle and upper reaches of the Yellow River and establishment of planned logging and forest protection in northeast China and Inner Mongolia. This project will necessitate the resettlement of some 483,000 redundant workers.

A paper reviewing forest law, policy and public participation was published by Wang (2001). The paper provides a good review of legislation and acknowledges that illegal activities reducing forest cover in China have become a national crisis. Wang states that addressing the problems, which beset native forests, has become a priority national policy. He concludes the main problems are poverty, motivation for profit, and ignorance of the law by some local governments, village committees and villagers. They all contribute to the existence of illegal activities. To overcome these difficulties, further developments are needed in economic reform, education, public participation, forest technology, and institutional capacity-building for implementing forest law and policy.

Surface water

Although China receives a mean average rainfall of some 680 mm about half the country, notably in the west and northwest, is arid, semiarid or desert. The northern part of China above the Chang Jiang covers 60% of total land area but has access to only 20% of the country's water resources. Annual precipitation is not only unevenly distributed by area but it also varies greatly between seasons of the year. The heaviest rainfall occurs in the summer throughout the country. The water sector is a major concern for China requiring extensive infrastructural development. There has been a huge increase in demand for water compounded by a drastic decrease in water quality. China's population is estimated to reach 1.6 billion people by the year 2030. The decrease in water quality has been caused by discharge of untreated or poorly treated domestic sewage and industrial waste and contamination from agricultural fertilizers and pesticides. Only 10% of China's 1.5 billion m³ of annual domestic sewage is treated and 4.5 billion m³ of industrial waste is discharged directly into waterways. An estimated length of some 2,500 km of river no longer supports fish life. In some regions of China, drinking water is unavailable for weeks at a time, and when available, is of poor quality by world standards. The largest lake Poyang Hu has shrunk by more than 100,000 ha due to land reclamation

activities, and Dongping Hu has also shrunk dramatically due to reclamation. Both these lakes contain areas designated as Ramsar sites. Flooding of river systems is also a recurrent major problem resulting in displacement of large numbers of people in wet years.

Inter-catchment transfer is practised widely in China. The Dongjiang River in eastern Guangdong supplies approximately 8% of its mean annual discharge to Hong Kong, which satisfies about 75% of Hong Kong's potable water requirements. The largest scheme under consideration will transfer water northwards from the Chang Jiang (Yangtze River) east of Nanjing to Beijing. Although these schemes are known to have deleterious impacts on fisheries the impacts on odonate populations are not so well documented. There may be marked alterations to existing flow regimes in the abstracted and receiving watercourses used as conduits for water transfer. Water transferred will also have to cross many lakes, so aquatic life in the lakes and rivers is likely to be affected due to changes in the physical and ecological environment.

CONSERVATION PRIORITIES AND RECOMMENDATIONS

Nature reserves and protected areas

The first nature reserve was designated in 1956. There has been a spectacular expansion of protected areas in the country over the past 25 years. By 1993 some 760 reserves totalling some 6% (66 million ha) of the total national area had been designated. At the end of 2000 China had designated a total of 1,227 nature reserves with a total area of 98.2 million ha, which represents some 9.85% of China's land area. About 70% are managed by the SFA and a large proportion of the remainder are managed by the State Environmental Protection Administration (SEPA).

However, approximately 44% of China's nature reserves lack an effective local administrative body and 35% have no management staff. Among the reserves' supervisors, only 22% have received technical training in environmental protection. SEPA is aware of these problems and during 2001 stated its priority was to focus on improving administration, management and training rather than designating more nature reserves. SEPA is also encouraging local governments to raise funding for management and protection purposes for its nature reserves. Nevertheless, over the next 10 years China intends to expand the area protected and establish a further 270 nature reserves with a total area of 65 million ha in its 14 western regions. Some areas such as Guangxi and Hainan are developing nature reserves for tourism and other projects such as deer farming.

Wetland reserves

A national wetland conservation action plan was published on 8 November 2000 in part as a consequence of China's signing of the Conventions on Biological Diversity and Climate Change at the Earth Summit in Rio de Janeiro in 1992 and becoming a party to the Ramsar Convention (the Convention on Wetlands of International Importance) also in 1992. China has classified 65.9 million ha as

wetland, the fourth largest area in the world, accounting for ca 10% of the world's total area of wetland. The Ministry of Forestry stated in 1998 that a total of 152 wetland-type nature reserves, including seven Ramsar sites, had been established in China to date. These seven Ramsar sites total some 588,380 ha. By December 2000 China had set up a total of 274 wetland nature reserves covering 16 million ha in area. China also announced it would select 16 tracts of wetland of international importance by 2001 for consideration as Ramsar sites. To date China has 21 Ramsar sites designated.

The most important wetland areas include (1) marshes in "Sanjiang" catchments in northeast China; (2) salt marshes in the Gobi Desert of the Inner Mongolia; (3) numerous lakes in lower reaches of the Yellow River and the Yangtzi River; (4) coastal marshes north of the Yangtzi River; (5) coastal marshes and mangroves of south of Yangtzi River; (6) meadows in the plateau of Yunnan, Guizhou and Sichuan Provinces; (7) huge salt lakes in the desert of the Uyger Autonomous Region; (8) alpine lakes in the northern Tianshan Mountains; and (9) alpine lakes and bogs in the Qinghai-Tibet Plateau.

The State Forestry Administration (SFA), United Nations Development Programme (UNDP) and the Australian Government are financing a US\$ 34.57 million programme for wetland protection in China during the 2000-2004 period. One of the most important impacts of the programme is to raise protection awareness among people living around existing major wetlands.

Research priorities

There has been a marked increase in taxonomic work on Odonata occurring in southern China's tropical and subtropical forests in recent years revealing the rich nature of a number of odonate groups and allowing the filling in of many distribution gaps. However, in view of the paucity of odonate survey work in many areas of China and the enormous pressures on closed forest areas in south-west and southern China from increasing populations and illegal logging activities there is an urgent need for more taxonomic and faunistic information on odonates, especially from subtropical and tropical areas.

CURRENT ACTIVITIES

Research projects

Staff of the Kadoorie Farm & Botanic Garden Corporation (KFBG) are collecting dragonfly material as part of a South China Biodiversity Conservation Programme which commenced in 1999. The aim of the programme is to help minimise the loss of biodiversity in South China's forest ecosystems. In addition KFBG is providing and offering financial support for postgraduate studies on the study of Odonata by mainland graduates. Ms Zhang Bing-lan is currently studying the Coenagrionidae of China at the Zhongshan University, Guangdong, with the help of a Kadoorie funded bursary.

K.D.P. Wilson & G.T. Reels are currently working on the anisopteran fauna of Guangxi and intend to publish their data in 2004 and plan to publish comprehensive information on the Guangdong fauna in the near future.

Organisations

The Agriculture, Fisheries and Conservation Department of the Hong Kong SAR has produced a field guide to the identification of Hong Kong odonates (Wilson 2003) and intends to launch a web site to provide information to the public concerning watching and conserving odonates.

Publicity work

An Asia dragonflies web site has been established by Eric Gilbert, who is currently based in Thailand, to provide information and a communication forum to anyone interested in Oriental odonates, <<http://www.asia-dragonfly.net/>>.

Chao, Hsiu-fu

Sadly during 2001, Chao, Hsiu-fu died (his name is also sometimes romanised as Zhao, Xiufu). He produced many excellent papers during his lifetime on Chinese odonates and his prolific taxonomic and faunistic contributions on the Gomphidae of China have greatly helped our global understanding of this family. Much of his gomphid work was presented and summarised in 1990 in his comprehensive book (Chao 1990). All together he published more than 50 papers on Chinese Odonata. A bibliography for Chao has been prepared and is scheduled for publication in 'Odonatologica' during 2004.

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